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ABSTRACT

A review of literature on technology and second language (L2) instruction focused on the use of seven different technologies: television/videotapes/tape recordings; hand computers; computer conferencing; electronic mail (e-mail); multimedia and hypermedia; computer-assisted language learning; and machine translation. A secondary purpose of the review was to integrate the findings concerning each technology into a holistic framework. Seventeen articles reported here were found to provide a cross-section of technological tools applied to L2 learning. The findings of those articles are analyzed, with attention to both current realities and future promise, in three areas: summary of the major contributions of each technology to L2 learning; major issues or concerns related to implementation; and research methods used in the studies. Future research is proposed. In addition, the Internet and emerging technologies are considered briefly. Contains 50 references. (Author/MSE)

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EDUCATIONAL TECHNOLOGY FOR SECOND LANGUAGE ACQUISITION: A REVIEW OF RESEARCH

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EDUCATIONAL TECHNOLOGY FOR SECOND LANGUAGE ACQUISITION: A REVIEW OF RESEARCH

Abstract

How is technology being used to solve the educational problems faced by the estimated two million non-native English speakers now in American classrooms and the dozens of millions in the world? Many ESL teachers agree that new technologies offer an unrivaled range of possibilities for student-centred language learning and at the same time that many implementation issues exist. What are the most promising educational technologies for second language (L2) learners? The primary purpose of this paper was to review the literature on the use of the seven different technologies with L2 students: (1) televisions, videotapes, and tape recorders; (2) hand computers; (3) computer conferencing (CC); (4) electronic mail (e-mail); (5) multimedia and hypermedia; (6) computer assisted language learning (CALL); and (7) machine translation (MT). The secondary purpose of this paper was to integrate the findings derived from each educational technology into a holistic framework. Seventeen (17) articles reported in this paper did provide a cross section of technological tools as they were applied to L2 acquisition. The findings of these reviewed articles were analyzed, focusing on the current realities and future promises, through the following three steps: a summary of the major contributions of each technology to L2 learning was provided; major issues or concerns related to implementations were presented; and research methods used in each study were given, following by a discussion of proposed future research. Finally, Internet and emerging technology were discussed.

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EDUCATIONAL TECHNOLOGY FOR SECOND LANGUAGE ACQUISITION: A REVIEW OF RESEARCH

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INTRODUCTION

Over the past quarter century, major developments in information technology have provided people with different types of computers, networks, electronic mail, videocassette recorders (VCRs), compact disc read-only memories (CD-ROMs), interactive multimedia and hypermedia. Almost every two years the computing power of microcomputers doubles, and conservative predictions indicate that by the year 2010, the microcomputer will be 1,000 times faster than today's machine (Barker, 1994/1995). The discipline which implements the above technology in education is thus referred to as "educational technology." The definition follows:

> Educational technology is a complex, integrated process involving people, procedures, ideas, devices and organization for analyzing problems and devising, implementing, evaluating, and managing solutions to those problems, involved in all aspects of human learning (Murphy cited in Talisayon, 1990).

As computers become smaller and more powerful, the software becomes easier-to-learn as well as easier-to-use. It is now possible to use artificial intelligence (AI) techniques in order to conduct limited translations from one language to another. Voice programs can be used for teaching proper pronunciation, multimedia can help in memorizing vocabulary, and electronic mail can enhance studies in a group when learners are in different locations, or even different countries. Hypermedia applications have the ability to link text and graphics allowing users to navigate non-sequentially through many information sources.

How is technology being used to solve the educational problems faced by the estimated two million non-native English speakers now in American classrooms and the dozens of millions in the world? Very few English as a Second Language (ESL) students have access to advanced technologies, and those that do are too often exposed exclusively to drill and practice (Hunt, 1993). VCRs and microcomputers are the foundation for numerous technological approaches to second language (L2) learning. There are also closed-captioned videos, optical-disc technologies such as CD-ROMs for microcomputers, and interactive videodisc systems which combine the

microcomputer with pictures of software programs. Multimedia-based technology with its capacity for rich imaging has great potential for actively engaging students and helping them to transfer what is learned in the classroom to communication in the real world. Finally, virtual reality (VR) may play a major role in the future of L2 learning.

Many ESL teachers agree that new technologies offer an unrivaled range of possibilities for student-centred language learning and at the same time that many implementation issues exist. What are the most promising educational technologies for L2 learners? The aim of this paper is to review the literature on the use of the following technologies with L2 students:

1 Televisions, Videotapes, and Tape Recorders
2 Hand Computers
3 Computer Conferencing (CC)
4 Electronic Mail (E-Mail)
5 Multimedia and Hypermedia
6 Computer Assisted Language Learning (CALL)
7 Machine Translation (MT)

In addition, the aim of this paper is to integrate the findings derived from each educational technology into a holistic framework.

1 TELEVISIONS, VIDEOTAPES, AND TAPE RECORDERS

Television, for better or worse, is a powerful medium for the transmission of information. Although the focus of language teaching practices is shifting from the printed word and knowledge of the language system to the use and communicative value of the spoken language in everyday settings, television is barely recognized as a source of L2 acquisition. Can televisions, videotapes, and tape recorders help improve general comprehension?

Oxford, R., Park-Oh, Y., Ito, S., & Sumrall, M. (1993). Learning a language by satellite television: What influences student achievement? system, 21(1), 31-48. (Article 1)

1-1 Foreign Language Learning via Satellite Television

According to Oxford, Park-Oh, Ito, and Sumrall, all factors (such as motivation, learning styles, learning strategy use, gender, previous language learning experience) influence language

achievement when instruction was delivered by satellite television. Distance education via satellite television is an important means by which many students can learn foreign languages around the world. This allows students who would not otherwise have the opportunity for foreign language learning to be served, and it also potentially saves significant costs for instructional personnel. This new delivery system can become more widely used throughout the world.

107 students (66 females and 41 males) participated in the study of 1991. They were American high school students from rural areas in the South, learning Japanese in the Japanese Satellite Program (JSP) of the University of Alabama. Four evaluation instruments were used: the Japanese Language Survey (JLS), the Strategy Inventory for Japanese Language Learning by Satellite (SIJALL), the Japanese Language Achievement Test (JLAT), and the Learning Channel Preference Checklist (LCPC). The SIJALL and LCPC were mailed to 175 students. Students completed these surveys under the direction of the local teaching partners. Of the 175 students, 127 returned the SIJALL (73% response rate) and 107 returned the LCPC (61% response rate). The JLS containing the motivation survey was mailed to students, with a response rate of 78 percent. All students completed the JLAT during the last week of classes. The instruments were used to test seven hypotheses, which are listed below together with the results.

Hypothesis 1 was supported (visual style will be more prevalent than auditory or hands-on styles, but many students will show a combination of learning styles): The most preferred styles were a combination of styles, and visual, whereas the least preferred were auditory and haptic (Chi-square = 31.52, $p < 0.001$). Hypothesis 2 was confirmed (patterns of relationship among different learning styles will be complex rather than simple): The visual style and the haptic style correlate negatively and very significantly ($r = 0.29$, $p < 0.009$), while the auditory style and the haptic style correlate positively and very significantly ($r = 0.33$, $p < .002$). No significant correlation, positive or negative, was found between visual and auditory styles. Hypothesis 3 was confirmed (students in the satellite sample will not show a strikingly high use of students-generate learning strategies): Frequencies of strategy use revealed that cognitive strategies were used most often ($M = 3.02$), followed by metacognitive strategies ($M = 3.00$), compensation strategies ($M = 2.94$), affective strategies ($M = 2.92$), social strategies ($M = 2.90$), and memory strategies ($M = 2.54$): $p < 0.001$. Hypothesis 4 was supported (Students' motivation will differ for learning Japanese): The factor analysis of the motivation measure resulted in two major factors

(general degree of motivation and perception of personal usefulness of the Japanese language) and two minor factors (general attitude toward Japanese people and attitude toward schools where Japanese were learned). Hypothesis 5 was supported more strongly for some variables than for others (motivation will be affected by other variables, such as gender, course level, learning style, and previous language learning experience): For motivation, focusing on integrative motivation and personal use, females had higher scores than males (female, $M = 31.19$; male, $M = 29.70$, $p < 0.017$). Hypothesis 6 was partially supported (gender will be influential in language learning by satellite): A t test showed that gender influenced Japanese language achievement at a nearly significant level. Females ($M = 18.9$) outperformed males ($M = 17.2$: $p < .07$). Analyses of variance show that other demographic variables (course level or previous language learning experience) were not significant in Japanese language achievement. Hypothesis 7 was supported (Japanese language achievement will be predictable by level of motivation, learning strategy use, and learning style): A multiple regression analysis showed that a combination of motivation, learning strategy use, and visual leaning style was predictive of Japanese language achievement at a nearly significant level ($F = 2.62$, $p < 0.06$).

Student characteristics play an important role in language achievement. The more motivated the students were and the more they used learning strategies, the better their Japanese achievement was. Satellite learning research aiming at improving achievement needs to address ways to heighten motivation and increase the use of Japanese learning strategies. In the satellite instructional setting, auditory students were significantly more motivated than visual and haptic students, but nevertheless visual students performed the best. Hands-on or haptic students, who require movements and the use of objects to learn optimally, performed worse than visual and auditory students and were also less motivated. This situation might have been related to the nature of the satellite medium. A variety of instructional activities should be employed in satellite instruction not only to motivate students with different learning styles, but also to measure their language performance more appropriately. In addition to using assessment procedures like paper-and-pencil tests and telephone oral assessments, individual term projects that reflect learning style can be given increased weight as performance measures. Finally, gender was somewhat influential in shaping motivation and language achievement.

Markham, P. L. (1992-93). Captioned television videotapes: Effects of visual support on second language comprehension. Journal of Educational Technology Systems, 21(3), 183-191.

(Article 2)

1-2 Captioned Television Videotapes for the ESL Comprehension

Markham conducted an in-depth study on the effects of captioned video material on ESL student comprehension. He used videotaped episodes which presented both low and high audio/video correlation. Prior study was restricted to high audio/video correlation material in which the audio track was strongly supported by the video portion (visual images). The primary intent of the study was to extend captioned video research to include information on the contributions of visual support as a factor in L2 comprehension. A total of thirty-seven advanced (Test of English as a Foreign Language [TOEFL] scores ranging from 590 to 615) and thirty-four intermediate (TOEFL scores ranging from 550 to 570) students participated in the study. Subjects represented a wide range of language diversity but 69 percent of them were North Asian, which necessarily restricted the generalization of the findings. Most of the students had been living in America for one year or less. The videotaped materials consisted of an excerpt from the educational television program "3-2-1 Contact" and an excerpt from an instructional video produced by the Center for Telecommunications of the Dallas County Community College District. Students were instructed to give their full attention to the videotaped materials without taking notes. After viewing each episode, they were given five minutes to write down all that they could remember using complete sentences (spelling and grammatical accuracy did not play a role in the scoring). The written summary allows students to recall and organize the content of the passage according to their level of understanding.

Two 2 x 2 analyses of variance (ANOVA) procedures were utilized in the study. A separate analysis was conducted for each of the two video episodes because of existing differences in the length and difficulty of the video material. As had been anticipated, the advanced students recalled significantly more idea units from the video than their intermediate counterparts. The results revealed that both groups were able to recall significantly more idea units ($p < .01$) when the captions that were available with the episode presented a low level of visual support (low audio/video correlation). Conversely, caption availability did not substantially improve student

recall when the episode presented a high audio/video correlation. The finding empirically confirmed the intuitively logical notion that captions would not likely to play a dominant role in high intermediate and advanced ESL student comprehension when the video images strongly reinforce the audio component. ESL students derive substantial comprehension benefits from viewing captioned video material. However, the captions appeared to be of questionable value for high intermediate and advanced students when the audio/video correlation was high. A partial solution to the caption use dilemma can be accomplished easily by taping a blank sheet of paper over the lower one-sixth of the video monitor when using open-captioned material (tapes with permanent captions), or by simply turning off the caption switch if the teacher is using a closed-caption decoder with a live broadcast. Captioned video material is an instructional resource for L2 education which has yet to be fully explored and appreciated. The potential of television has been enormous, and thus the captioned television videotape constitutes a relatively inexpensive and potentially powerful instructional tool.

Egbert, J. (1992). Talk to me: An exploratory study of audiotaped dialogue journals. Journal of Intensive English Studies, 6, 91-100. (Article 3)

1-3 Listening And Speaking via Audiotaped Dialogue Journals

Egbert, in his introduction to the exploratory study of Audiotaped Dialogue Journals (ADJs), suggests that ADJs provide a medium, through which teachers can come to understand better the needs of individual students and to facilitate their movement through various stages of growth while helping them to evaluate their effectiveness of communication. ADJ use warrants investigation for several reasons. First, ADJs could have a significant impact on programs where efforts are being made to raise the effectiveness of ESL courses. Second, ADJs may be especially useful in programs experiencing the so-called "quiet classroom." Third, ADJs may be part of a solution to the problem stemming from the increasing numbers of students from Asian countries, who are now enrolling in the U.S. English programs and who often are not proficient in the spoken language when compared with students coming from other parts of the world.

The study asks "What is the role of ADJ in the classroom?" To find out the answer, patterns evidenced during participation in the ADJ were examined. Three areas where patterns were

expected were (1) form of the conversation (length and type of comment); (2) nature of the conversation (content); and (3) relationships between the participants (teacher/student, teacher/ADJ, student/ADJ/language). A case study approach was used and data were collected through systematic interviews with the two instructors and four students involved in the pilot study. The ADJs generated by the participants over a ten-week period were gathered, along with teacher notes. Due to the lack of complete data, data for only two students were used in developing the coding scheme. The data reported in the study are for (1) Student S (a Japanese female in a high beginner class) and Teacher S (an American male), and (2) Student M (a Latin American male in a low intermediate class) and Teacher M (an American female).

For the form of conversation, Student S and Teacher S each made four required entries while Teacher M and Student M each made six entries over the course of the period. Students spoke an average of 300 to 500 words per entry, and teachers spoke an average of 700 words per entry. In teacher entries, 48 percent to 65 percent of the content consisted of repetition (usually of the learners' mistakes) leading to explicit correction. In contrast, 70 percent to 83 percent of learner entries consisted of new content including follow-ups. Concerning the nature of conversation, students' personal comments decreased in number over time but the intimacy of the comments increased. Concerning the relationships among participants, ADJ served as a personal tutor in its major role and as a mutual source of information in its secondary role. The significant part of the role of ADJ in these two cases seemed to be to provide grammar assistance.

No conclusion about changes in the form of the conversation can be made from these cases. They do suggest, however, that learners may speak more and use a wider range of vocabulary if the journal assignment is slightly structured. It is interesting to note that the length of teacher entries did not seem to affect those of the students, nor did the content of the student and teacher entries bear an overwhelming resemblance. Also of interest is that, while the number of student new content comments decreased, the number of follow-ups remained stable. This implies that students became more involved in explanations of the new content than in simply adding new comments. These journals may be an outlet for the learners to express the personal side of a student/teacher relationship that is grounded in the classroom. A teacher stated that he felt more rapport with learners, as a result of seeing the journals. It does seem that the relationship between teachers and the ADJ and between students and the ADJ changed. Learners expressed a greater

degree of comfort with the journal in the middle and at the end of the session. As is the case with the written journals, the audiotaped journals offer "one-on-one communication between teacher and student" or "between the student and other speakers."

2 HAND COMPUTERS

Inherent in the learning of a foreign language is the learning of a large vocabulary. In the process of word acquisition, quite some time is spent on memorizing. Memorizing words, however, is a time-consuming, even boring, activity, and some of the words learned are forgotten relatively quickly. Is the hand computer an efficient method for memorizing words?

Mondria, J-A., & Vries, S. M-D. (1994). Efficiently memorizing words with the help of word cards and "hand computer": Theory and applications. System, 22(1), 47-57. (Article 4)

2-1 Hand Computers in Memorizing Words

Mondria and Vries argue that the hand computer, based on two learning-psychological principles (distributed practice and retrieval practice), has various advantages over traditional memorizing using either contextualized or noncontextualized inflexible lists. One of the weak spots of traditional forms of memorizing, such as memorizing with the help of a word list from a vocabulary notebook, is the lack of repetition. The hand computer is basically a deck of cards in which word cards are combined with a repetition system that uses ever bigger repetition intervals. Word cards are the so-called "flash cards": cards with the foreign word on one side and the translation on the other. The hand computer, which combines word cards with an ingenious repetition system, is therefore efficient in vocabulary acquisition.

Vocabulary acquisition has three stages: presentation (the learner is faced with the unknown word), semanticizing (the meaning of the unknown word becomes clear), and consolidation (the relation between the word and its meaning is made lasting). Working with word cards and the hand computer has a number of learning-psychological advantages including (1) while learning, the learner concentrates on those words he does not yet know, (2) the order of a series of words to be learned is flexible, (3) with the hand computer the knowledge of all words learned is checked at various moments (distributed practice) by means of increased intervals (expanding rehearsal), and (4) by writing, the word on the cards, the learner pays more attention to the word

form of the foreign-language word. Working with word cards or the hand computer is suitable for all types of learners at all levels and even for all kinds of subjects such as history (dates), biology (terms), or chemistry (formulas). Some types of applications of word cards and the hand computer are shown in Table 1.

Table 1. Applications of Word Cards and the Hand Computer

System:	Only word card (without repetition system)
	Hand computer (word cards with repetition system)
Design:	Computer assisted language learning program
Learner:	Beginner
	Advanced
Organization:	In class (all learners)
	Individually (only weak students)
Subject matter:	Isolated words
	Words in sentences
	Idioms
	language functions
	Pronunciation
Source:	Course book
	Vocabulary book
	Independent reading
Option:	All unknown words
	All unknown words that are difficult to learn
Desired level of knowledge:	Receptive
	Productive

In various secondary schools in the Netherlands, positive results in learning vocabulary have been obtained with hand computers. Computer-assisted language learning (CALL) programs based on the hand computer are available now in the Netherlands. The major advantage of the computerized version over the manual version is that the computer has a motivational impact on many students. The hand computer is a very efficient system for learning vocabulary because of the inclusion of cards for memorizing words and the sophisticated system to reinforce the words learned. Using such a system, memorizing words with the hand computer is clearly superior to memorizing words using inflexible lists. The hand computer is also very flexible with respect to content (words, idioms, pronunciation) and the learner (weak/strong, beginners/advanced, in class/individually).

3 COMPUTER CONFERENCING (CC)

Computer conferencing (CC) is a computer-mediated communications medium, in which individuals or groups are able to interact with each other through electronic media, without the

constraints of having to meet at a specific place and time. Is CC a satisfactory alternative to face-to-face communication for a variety of communication activities? Can ESL or English as a Foreign Language (EFL) students learn via teleconferencing?

Leppanen, S., & Kalaja, P. (1995). Experimenting with computer conferencing in English for academic purposes. ELT Journal, 49(1), 26-36. (Article 5)

3-1 Computer Conferencing in Higher Education

Leppanen and Kalaja report an experiment in which the applicability of CC was tested in English for Academic Purposes (EAP) course. The experiment was part of a larger project (which involved the Department of Education, and the Institute for Educational Research of the University), in order to explore possibilities for making use of CC in higher education. The motivations for the experiment was examining the suitability of CC in the L2 context, making writing more attractive, and providing flexibility in the organization of classroom discussions.

A group of five first-year students (out of some sixty attending the course) taking a content-area course participated in the experiment. After two hours of technical training in the Spring term of 1991, they used CC for two purposes: instead of meeting in class, they discussed topics via computers; and instead of writing one version of each essay, they were introduced to the idea of writing as a process by producing an initial outline and getting feedback on it via computers. The group discussed ten topics, a different one each week. They also wrote two (thousand word) essays whose titles were "The role of the Constitution in the U.S. and Finland," and "The effect of American Icons on Finnish Culture." All CC was done in English. One of the most interesting findings was that the group dynamics changed drastically compared with traditional classroom discussions. In the ESL classroom the teacher normally dominates and does most of the talking. In CC the students came to do most of the "talking, using CC not just for answering the teacher's questions, but for other functions (they expressed opinions, argued, and commented on each other's messages). Most significantly, the students signaled their awareness of the groups as a particular social unit. It turned out that the number of comments the students received on their writing increased, and more important, the comments differed in quality from those made by the teacher who had essays from a number of perspectives (content, organization, and grammar).

However, if they all had a PC and a modem, they could use the system off- campus as well as on-campus. (Note: In 1995 there appeared on the market a desktop video teleconferencing machine which costs about $1,200. It will be interesting to conduct experiments, using such computers, on CC supported by both video/audio and screen sharing for ESL acquisition.)

Davis, B. H., & Ye-Ling, C. (Winter 1994/1995). Long-distance collaboration with on-line conferencing. TESOL Journal, pp. 28-31. (Article 6)

3-2 Cultural Awareness Through On-Line Conferencing

Davis and Ye-Ling have conducted CC for the past four years and were confident that students on both sides of the world would redirect and expand the topics to reflect their own interests. Students in NKNU began with a short informal exchange of letters E-mailed to UNCC one week and answered the next. It took three years until both teachers learned how to design CC in ways which could promote greater English fluency and comfort for both sets of students.

In the fall of 1992, both authors taught History of the English Language, focusing on collaboration and discussion. At the same time they had an eight-week teleconference with student-to-student personal interaction using prompts that would (1) foster cooperative writing and discussions in small groups on each campus, (2) introduce useful reference tools and techniques of analysis of word formation, and (3) reinforce aspects of usage that troubled both sets of students. They expected that UNCC students might use a mixture of complex and compound sentences, and NKNU students might prefer to use compound subjects and predicates, and prepositional phrases within a simple or compound sentence framework. The results of this case study suggested that the expectations were realized. Even though the conference lasted only eight weeks, NKNU students moved to incorporate more complex sentences and UNCC students moved to edit their dangling modifiers. This electronic collaboration, beginning with the first pen-pal exchange, has moved into a different sort of long distance collaboration--the realm of electronic team teaching. Students in both countries valued personal exchange and saw even more value in the exchange if they could use their new information to expand their cultural and linguistic understanding and correlate the experience with their course content.

Perhaps the most important feature of CC is the chance for students consciously to become

collaborative members of a discussion community of their own creation. Students reported great satisfaction. Since most of the students on both campuses intend a career in teaching English, they are responsive to topics which illustrate or exemplify concepts and methods that they may have studied, even if they do not always have immediate experience with them. An example of this is a prompt that allows students to work with a set of conventions for letter writing in English. Finally, although incorporating CC as a supplement to teaching and learning requires a conceptual framework from which to develop instruction that would be most appropriate for a particular learning context (Velayo, 1994), this case study proved that electronic exchange is one way to foster students' growing awareness of themselves, the languages they are learning, and the students throughout the world who are their audience.

4 ELECTRONIC MAIL (E-MAIL)

An electronic message is a letter sent and read in real time while electronic mail (E-mail) usually refers to a one-to-one connection (a letter sent and read on-line in non-real time). E-mail also refers to bulletin boards, which can be read by more than one person. Perhaps the most common means of communicating in academia today is by using E-mail via the Internet, a system of global computer networks (Busch, 1994). Does E-mail encourage L2 students to use computers in realistic situations so that they can develop their communicative and thinking skills?

Kroonenberg, N. (Winter 1994/1995). Developing communicative and thinking skills via electronic mail. TESOL Journal,pp.24-27. (Article 7)

4-1 E-Mail and Multinational Students

Kroonenberg reports on the impact of using E-mail in developing communicative and thinking skills. In the 1992-1993 school year, she used E-mail for her two classes of multinational students in Grades 9-12. By accessing the school's Dragon Bulletin Board System (BBS), using TELIX (software from Canada) communications software, students and teachers sent private messages and had 100 conferences. Initially they could only dial in to their own school's conferences but now can make contact with other Hong Kong schools and international sites. The English and Modern Language Departments set up local conferences, and many L2 students registered for several conferences across the curriculum. The difference between the BBS

conference assignment in which Kroonenberg asked students to respond to a particular topic and a normal written assignment is that in the former, students had access to what everyone else in both classes wrote and could respond to other students' entries. When Kroonenberg responded to entries, she focused on content, looked at logic and thought, and prodded students to probe further. For other conference assignments, students were the principal audience. Students typed in their entries, read a specific number of other entries and expressed their opinion about them via E-mail. They showed positive attitudes toward the conference assignments, and students who were usually timid about participating in class became active participants. They had a chance first to get their thoughts on paper and then to think through their own and others' opinions. Such a process, while time-consuming, ensured that everyone was engaged in writing about the topic and in participating in the ensuing discussion. In addition to fostering writing skill, E-mail activities foster students' reading comprehension and thinking skills; thus, thinking and writing are interdependent processes which can be enhanced by computers. Reading, speaking, and listening skills can also be strengthened since once students input their entries, classmates can read them and respond both in writing and orally. E-mail is a new approach to teaching and it provides an access to a repository of learning materials for use in the classroom.

Tillyer, D. A. (1993). World peace and natural writing through email. COLLEGIATE MICROCOMPUTER, 11(2), 67-69. (Article 8)

4-2 Practicing Natural Writing Through E-Mail

Tillyer maintains that ESL teachers have been struggling to get ESL students to write and to practice so that they can produce decent writing. According to Tillyer, Pat Rigg writes: "writing must be real" and "language is social." To be communicative, a piece of writing must have two human beings: a writer and a reader. In the spring of 1992, Tillyer enlisted a group of sociology students from Arizona State University as pen-pals for his upper level ESL students at City College. His purpose in having students communicate by E-mail was to force them to become dependent on the English language in order to accomplish an emotionally satisfying goal. As Adele MacGowan-Gilhooly writes, according to Tillyer, "Fluent writing must be emotionally satisfying and meaning driven." The students had three objectives in their use of E-mail: social

discovery (they had new friends), cultural resources (their new friends became logical resources), and teacher contact (E-mail adds a dimension which is heretofore unknown for ESL students and their adjunct teachers). Results of Tillyer's experience with E-mail have been satisfying. Advanced ESL students discussed such issues as prejudice, the presidential election, and the civil war with their American pen-pals. As Steinberg (1992) points out, when students direct their writing to a specific audience for purposes other than demonstrating a skill, they are more likely to use the skills they learned in the classroom, as the students did in this case study. The native speakers had the opportunity to become experts on all sorts of issues and the ESL students had their chances to shine as international experts.

E-mail communication is very close to real task-oriented communication for ESL learners. The E-mail method fits nicely with the Fluency First Program at City College where emphasis is put on volume of writing (and reading). The E-mail is satisfying to the students because it allows them to write something which is meaningful not only to themselves but also to someone else, and because it allows them to choose what they write about.

Goodwin, A. A., Hamrick, J., & Stewart, T. C. (Autumn, 1993). Instructional delivery via electronic mail. TESOL Journal, 3, 24-27. (Article 9)

4-3 E-Mail Enhances International Students' Assignments

E-mail was originally designed as a channel of communication among military units and only few specialists anticipated its powerful advantages of speed, low cost, and secure communication. Goodwin, Hamrick, and Steward, all of whom are with the English Programs for International (EPI) at the University of South Carolina, report on the University's EPI that provides English for academic purposes in a U.S. university setting for students from various academic and cultural backgrounds. EPI started in 1992 with the aim of delivering English language instruction to LASPAU (Latin American Scholarship Program of American Universities) scholars prior to their arrival at the United States. Most of the LASPAU scholars were engineering or computer science students with ready access to computers and E-mail at their respective universities. With those students, and by using E-mail, EPI undertook a new distance education which emphasized reading and writing activities that addressed aspects of academic writing. The use of E-mail is one

example of technology which is developing unanticipated applications. E-mail technology is emerging as a means of instructional delivery across international borders. E-mail use in English language instruction has been effective primarily for interpersonal communication among learners (e.g., electronic pen-pals). For the EPI assignments, students wrote their biographies and curriculum vitae and did a rudimentary text analysis of their own writing, both in Spanish and English and then compared the results with the professional biographies.

Even though there are difficulties in maintaining contact between assignments, and reinforcing deadlines through electronic networks, students from using E-mail benefit in such ways as (1) increased communication in the target language and one-to-one interaction between the teacher and the student take place, (2) students receive the rhetorical and linguistic knowledge, and (3) the students read and analyze topics interesting to them as computer scientists and engineers. In the future, EPI hopes to have a series of assignments that can be broadcasted all over the world and tailored to give individual participants the chances to learn English while remaining in their home countries.

Markee, N. (1994). Using electronic mail to manage the implementation of educational innovations. System, 22(3), 379-389. (Article 10)

4-4 E-Mail for Managing Educational Innovation

Markee reports that the use of E-mail is not just limited to setting up opportunities for ESL students to find pen-pals to practice their English, but also it represents a new resource for managing the implementation of educational innovations. Specifically, the author reports that E-mail is a potentially very important management tool for promoting educational change. A rather different use of E-mail can represent an important new resource for program administrators interested in the management of innovation. Markee used an E-mail list to manage the introduction of change in the ESL service courses at UIUC. The ESL courses met the academic English needs of approximately 600 learners per year, most of whom come from China, Korea, and Japan. ESL courses were taught by Teaching Assistants (TAs) and the E-mail list (Talist) was set up to facilitate communication concerning the development and implementation of curriculum development among TAs and between supervisors. All TAs and supervisors subscribed to the

"Talist." Using personal computers connected to a mainframe computer, subscribers sent messages to a central server, which then automatically distributed their communications to all the people who subscribed to the "Talist."

In spite of the fact that some individuals were afraid that the E-mail list would replace face-to-face communication when it was started, this innovation surprisingly promoted communication between supervisors and TAs and facilitated the management of educational change. The major reason for the success was that the "Talist" allowed directors informally to discuss or float proposals for change with teachers while communicating with all interested parties with maximum efficiency, irrespective of whether they actually sent any messages to the list themselves.

5 MULTIMEDIA AND HYPERMEDIA

Traditional audio and video devices (such as television, audio-video cassette players, and overhead projectors) have been utilized in the classroom for many years. The ongoing advances in multimedia and hypermedia technologies, along with reduced costs, are resulting in the emergence of interactive multimedia education in which students can interact one-on-one with the communication media. Students can follow their own pace and to determine the depth and breadth of a specific education area to pursue. Is it possible that the educational needs of students can be more effectively fulfilled by utilizing multimedia?

Koros-Mikis, M. (1994). Learning languages in a creative way: Young children using the computer in discovering the written word and the spoken language. Educational Media International [EMI], 31(3), 193-196 (Article 11)

5-1 Computers Enhance Children's Creativity

Koros-Mikis points out that the computer is the same sort of aid as drawing sheets or colored crayons when referring to the ways in which children communicate their messages, and their stories to others. Since 1984 she has participated in developing a number of curricula and in setting up school information. Her research interest is the application of technology to education. Many people are quite appalled when they hear about small children working and creating by computers. They feel sorry for the children who are not allowed to play at such a tender age, whose heads are instead being filled with all sorts of complex ideas about information science.

These people could not be more wrong. For children, the computer is a tool to achieve their own objectives. In the kindergarten the machine plays the same role as the toy kitchen or the building blocks. It has been demonstrated that the computer's creative application actually speeds up the rate of learning and provides maximum opportunity for skills to emerge. If traditional means were used, these results would probably come to the surface a great deal later. If the appropriate software is available, it is possible for children to learn in a language different from their own.

One of the most efficient methods of computer-aided learning of the mother tongue for small children originated in France and was developed by Professor Rachel Cohen and her research team at Paris-Nord University. Their investigations were conducted over six school years with tests involving thousands of French schools and nurseries. The results of the tests are highly impressive: progress in understanding texts appears to be rapid, as well as dyslexia and dysgraphia are becoming practically nonexistent. The computer is being regarded as the most suitable means for deciphering of messages, and for production of written creations since it offers the possibility of individualized development at each child's own pace. By showing arrays it provides a permanent possibility for self-correction, and it is highly motivating. This strengthens the child's sense of "I am doing it."

The use of computers requires appropriate software. The program "Fairy-Tale World" is extremely well suited to the application of computers in early childhood. This software was originally designed for small children learning Hungarian in kindergarten. Its outstanding success among teachers and children alike provided the impetus for the development of versions for small children who are learning a foreign language and for beginners in English, French, German, and Spanish. The software has been developed for IBM or IBM compatible computers using any kind of graphics card. Naturally, pictures appearing on a colored screen have a greater appeal to small children. Children should be able to operate the program very easily with the direction (arrow) keys or a mouse. It should be friendly, easy to operate, and should make maximum use of colored, graphical screens. The figures appearing must be inventive, attention-provoking, friendly, and familiar to the children. The musical effects should be associated with the given function of the program and melodies played should be children's songs. The software "Fairy-Tale World" meets these criteria. The program, however, is only a tool in the hands of a well-prepared, and qualified teacher. Teachers' role is even more important in the teaching of

languages at an early age. As Koros-Mikis concluded, even if the activity of children is being rewarded by the machine, no rewarding tune can compare with the effect of living speech, a smile or a kind word from the teacher.

Fabris, M. E. (1992-1993). Using multimedia in the multicultural classroom. Journal of Educational Technology Systems, 21(2), 163-171. (Article 12)

5-2 Multimedia in the Multicultural Classroom

Fabris used an innovative approach to demonstrate that multimedia (or multiple electronic media) has a great potential for the "multicultural" classroom. A salient characteristic of American society is diversity. The implementation of a curriculum that has a multicultural perspective may raise several issues and have numerous implications. Nevertheless, foreign students learning many aspects of the American culture must be encouraged to maintain the essentials of their own cultural identity within our multicultural society. To create multimedia lessons, teachers need only imagination and some minimum familiarity with computers. The basic technology required to create simple multimedia lessons is already available in most schools.

Hypermedia are simple-to-use multimedia authoring programming environments. Digitizers have the capability to record and play sounds directly from teacher and student created materials. Using a scanner, students can digitize their art work and maps. CD-ROMs hold vast amounts of "ready to use" information on easy to handle small silver discs. Videodiscs have several crucial advantages, some of which are the tremendous storage capacity, superior image quality, dual audio track, durability, and almost instantaneous random access. Video Camera, VCR, and tape recorder are very popular and simple to use. Multimedia can provide supportive environments in which multicultural students are able to practice their writing, reading, and communication skills. Accordingly, multimedia technology in the multicultural classroom:

(1) Allows dialogue and communication.

(2) Enhances creativity.

(3) Fosters a sense of personal worth.

(4) Facilitates collaboration among students working together.

(5) Increases the possibility for interdisciplinary projects.

(6) Permits rich learning experiences for all students.

(7) Strengthens communication skills.

(8) Permits students to express their feelings and opinions.

Multimedia in the hands of a resourceful teacher can help create situations that stimulate interest, generate questions, find problems, or motivate investigations. Some of the ideas for teachers' lessons include the use CD-ROM based encyclopedias to create customized electronic lessons, and interactive tutorials that supplement conventional classroom instruction, and the use of videodisc to add audio and visual clips (real language, spoken by real people in real situations) to the teacher's own material in the multicultural language lesson. Ideas for students' projects include simple HyperCard stacks by which multi-culture students can create and bring to life (with sound and animation) stories, personal events, and even simple poems, and using the features of the VD systems (slow motion and chapter search) to create new dialogues, word games, and original scripts. Multimedia technology has the ability to have an impact upon and to enhance the multicultural classroom experience. Today's educational market is flooded with many excellent videodiscs, CD-ROMs, and low-priced devices from which to select. The standard of quality, however, needs to be established with respect to software production, and the careful exploration of classroom techniques must continue (Forrest, 1993). A rich multimedia environment can change the way teachers teach and students learn. Malhotra and Erickson (1994) identify three factors which significantly determine the rate of diffusion of multimedia technology in education: the available multimedia storage devices, audio and video data compression techniques, and the data transmission media. According to Atkins (1993), the educational debate about the appropriate use of multimedia applications should be focused more on the concept of partnership and take more account of the structure of knowledge domains.

Meskill, C. (1993). ESL and Multimedia: A study of the dynamics of paired student discourses. System, 21(3), 323-341. (Article 13)

5-3 ESL Students Working with Multimedia

A study by Meskill examined the interactions of pairs of language students with multimedia. Six pairs of ESL students were videotaped while working with the instructional system. Recent

studies emphasize the role of active communication and consider student-student interaction to be an essential contributing factor in ESL learning. The study has as its focus an analysis of the three-way (computer to student A, Student A to Student B, Student B to computer) dynamic which results from pairing language students with a computer-based multimedia system. Six pairs of low-intermediate students (average score on Michigan Test of Aural Comprehension = 72) were recruited to engage in what was set up to be cooperative learning with multimedia materials for ESL.

The 12 subjects were from eight different countries. All subjects reported having at least one year of experience using computers and being familiar with a mouse and pull-down menus. The study was based on the assumption that the more open-ended and less computer-driven the courseware, the more likely rich communication between paris of users would ensue. The software application used in the study had as its focus a series of cartoon storyboards that when strung together told a story, a story very much open to interpretation. In this CD-ROM-driven activity, students were provided with a series of options for working with digitized pictures and their accompanying audio sequences. The subjects were told they could spend as much time as they wished on the system and write a story using the on-line notebook. They were interviewed to gage affective reactions for the materials and for working with a partner. Sessions were videotaped and transcribed. Analyses focused first on capturing NNS (non-native speaker) attempts at "dual" conversational management with respect to the configuration and on searching out patterns of interaction with the partner and with the system. Second, NNS discourse was compared to that of a pair of native speakers (NSs) assigned the same task. Trends in the NS conversation were then contrasted with those of the NNS pairs. The one-computer-two-student configuration was a demanding proposition for NNSs. It was found that the discourse they typically engaged in was meager. By contrast, the NSs engaged in what was characterizable as communication-rich interaction in spite of the configuration's inherent "obstacles." The results confirm the assumption that the computer-as-human metaphor drives patterns of interaction on the part of paired language students. Computers and software are in fact built for single users who reflectively and actively engage in tasking with them. In contrasting NNS discourse with that of NSs who are given the same configuration, it could also be concluded that the social and cognitive limitations the configuration imposed could be overcome and complex human dialogue could

ensue. Analysis of the NS dialogue compared to the NNS dialogue revealed that what the NNSs seemed to lack to compensate for these limitations were the linguistic tools with which to negotiate a working framework and to maintain open channels of communication with their partner.

The conclusion appears to be that NNSs need some assistance and guidance in working cooperatively in this three-way configuration. Students of diverse nationalities come to all language learning activities equipped with culture-specific inventions concerning how things are done. The ESL teacher typically exploits these differences and puts them into an arena where students learn about other cultures and value systems while practicing English. Understanding the dynamic and the discourse inherent in paired NNSs at a computer can provide the means for teachers to do likewise for cooperative machine centered work. Whereas computers are environments in which something is presented and correlating reactions occur based on selections made, in human-human interactions the alternative are neither Boolean nor algorithmic. By examining the complexities of human-human-machine interaction, ways can be considered in which student-student exchanges might be facilitated in light of the strengths, limitations and corresponding linguists aspects inherent in pairing language learners with a multimedia system.

6 COMPUTER-ASSISTED LANGUAGE LEARNING (CALL)

Language learners would benefit from access to a wide assortment of acquisition resources. Computer-assisted language learning (CALL) is one example of a recent innovation in instructional resources. Several studies caution, however, that CALL materials do not represent a uniform learning experience for all students (Murphy, 1992). What are the aspects of CALL as a language acquisition resource center for L2 learners?

Swann, P. (1992). Computer assisted language learning for English as a foreign language. Computers Educ., 19(3), 251-266. (Article 14)

6-1 Computer Assisted Grammar of English (CAGE)

Swann conducted an in-depth experiment to investigate the CAGE (Computer Assisted Grammar of English) project. It involved the design, implementation, and evaluation of a CALL system (on the Apple II machine) for Italian secondary school students. The aim of the project, based in part on his doctoral dissertation, was to explore the potential and limitations of "drill and

practice" software in foreign language learning. The system was integrated into the students' regular subjects in a year-long evaluation with two classes ($N = 25$). Traditional drill and practice exercises were combined with a variety of innovative representations to provide a "cognitive-learning based" approach to English sentence structure. To conduct a proper evaluation, it was necessary to target the system on an educational setting where it would be possible to involve fairly large numbers of students. The first years of the upper secondary school was chosen for the project. Students had learned English for two years in middle school but they were in need of remedial grammar. The success of previous CALL systems has often been attributed to four qualities: (1) efficiency, (2) motivation, (3) individualization, and (4) interactivity. The CAGE system needed to contribute at least as effectively as previous systems. In CAGE, there are two main types of exercises: fixed format, and free format. Only the first type was used in the experiment. It was predominantly drill-and-practice, that is, students had to work through a large number of discrete items with the goal of improving their speed and accuracy.

Subjects had one session per week with the software throughout the school year as part of their normal course of study. They were given a pretest and a posttest. Detailed questionnaires and interviews were used to collect data on the students' reactions to the software. When asked to rank a list of teaching activities in order of importance, they placed grammar explanation at the top of the list, together with the language laboratory, CALL and conversation practice with the teacher. Communicative activities (e.g., games, and role-play) received very low ratings. Students wanted to be taught a "structured, grammar-based course." The students' judgment of CAGE was extremely positive. 96 percent of them were in favor of CALL after their use of CAGE and believed that the software had a positive impact on their learning of English.

When asked to weight some possible future developments of the system, they voted heavily for an on-line dictionary and automatic score keeping, while games and pictures came last. An analysis of the test scores largely confirmed the students' evaluation. Pretest scores fell in the range of 35 to 90 percent, and posttest scores in the range of 60 to 95 percent. All students did better on the posttest than they did on the pretest, with the actual gains ranging from 3 to 39 percent. The two classes were fairly well separated on the pretest by a partition value of 55, but merged completely on the posttest. Although the project dealt with only one of the possible applications of information technology to language teaching, the results suggest that the system is

an acceptable and effective for L2 learning. Thus, using CALL for "drill-and-practice" grammar exercises to support an existing course represented a logical development of previous work. On the English grammar tested, there was a mean gain score over the year well above what would had been expected without the CALL software.

Why was the system a success? The author gives several reasons: 1) cage made full use of the intrinsically motivating aspects of the medium, 2) the exercises and activities on CAGE are clearly related to the grammatical structure of English as it is explained in the students' manuals or by their teacher, 3) a major feature of CAGE in this area is to use CALL to offer a comprehensive treatment of certain areas of English morphosyntax that are considered of particular importance for the target students, 4) at a deeper level, CAGE has a hierarchical goal structure that reflects the constructional approach to grammar, 5) there is no doubt that the hierarchical structural analysis of traditional grammar provided an all but irreplaceable framework for the language learner, and 6) all the above factors presumably contributed in some measure to the success of the system with these studies. Finally, there is a great deal of excitement about applying multimedia technology to CALL, especially interactive video and hypertext approaches. This allows a much richer content to be included in exercises and makes genuinely communicative integration possible.

MacDonald, G. (1992). Computer enhancement of grammar study for the English as a second language student. COLLEGIATE MICROCOMPUTER, 10(3), 183-192. (Article 15)

6-2 Computers Enhance ESL Students' Grammar and Composition

MacDonald believes that computer use affects ESL students in practical ways. It helps students not only to integrate grammar and composition effectively, but also to help promote greater attention to exchanges of ideas and criticism, and quick, easy methods for manipulating language for variety, focus, and emphasis. Although most ESL students recognize the need for grammar study, it is considered a chore to be endured for the sake of improved language skills. At the very least, it reduces the problems of student handwriting and gives students practical reasons to devote more time to grammar. In the very best, it helps students better understand the flexibility of patterns and the need for intelligent choices to control meaning.

Simply as an improved format for traditional grammar exercises, the word processing

program of a user friendly computer such as a Macintosh offers a number of psychological advantages: (1) computerized grammar work provides an advantage over handwritten work because the students see what they are doing in a different way and interpret their action more positively, (2) while combining two sentences looks daunting in a textbook, combining a greater number of longer units is not so daunting on the computer. Most ESL teachers agree that sentence combining is an effective tool for teaching non-native speakers grammatical relationships. Sentence combining calls for an active rather than a passive response to grammatical problem solving and it potentially provides the student an opportunity to commit a number of correctable language errors. While the same concepts could be explored through sentence combining with paper and pencil, combining with word processing can be faster, more realistic, and by far more engaging. Instead of a sequence of sentences of equal difficulty and unvarying patterns, a composition exercise that becomes harder and encourages thought about the meaning of the grammatical form in use is more easily managed as a computer exercise, guided by teacher questions about importance and about relationships. Thus, the exercise itself becomes a voyage of discovery about language and meaning.

The author thinks the greatest contribution the computer makes to grammar is that it easily and effectively blurs the lines between grammar and composition and between mechanical skills and creative thought, and forces student awareness of practical grammar at work in the sentences that the students might use in creating paragraphs and essays. Another effective way to integrate grammar and composition through computer use is with extended sentence combining exercises that include instructions calling for the use of patterns being discussed in class at the time. Moreover, such an exercise, which reads the list of sentences and combines the sentence into a tight, focused descriptive paragraphs, can be done using the patterns for good writing that have been studied over the semester. Parallelism, subordination, adverbial clauses, adjective clauses, participle phrases, appositive, gerunds, infinitive phases, absolutes, abstract noun phrases and others all can be included. Finally, grammar needs to be more effectively integrated with composition if it is to serve practical needs and to have an impact on student usage. Computer use not only makes such integration feasible, it promotes greater attention to meaning, exchange of ideas and criticism, as well as quick and easy methods for manipulating language in a number of ways.

7 MACHINE TRANSLATION (MT)

The assessment of machine translation (MT) quality is a difficult task. No standard evaluation method has come to the fore over the past three decades (Minnis, 1944-1995). Although extensive experience and know-how for the practical use of MT have been accumulated over the past ten years (Kawasaki, Yamamoto & Yamasaki, 1991-1992). MT is one of the knowledge areas where there is a big difference between what is claimed in theory and what is really done in practice. Can MT be incorporated into the methods to improve comprehension ability for L2 learners?

Leffa, V. J. (1994). Machine-translated text:Is it comprehensible to proficient readers? System, 22(3), 391-399. (Article 16)

7-1 Translation from English to Portuguese

Leffa conducted a study on the possibility of using microcomputers to produce comprehensible translations from English into Portuguese. The study describes the approach used to produce a MT program and the results obtained with the translated texts stated in terms of a reading comprehension score. The program was designed for IBM-compatible computers but its current version works with any model. It was designed to store and process information on the English language, including lexical meanings, syntactical constraints, and disambiguating rules. This information produced a data structure which was used to parse the English sentences and produce a Portuguese text. The comprehensibility of the translated passages was tested with secondary school students by using both machine-translated passages and professional human translations. Each subject answered a reading comprehension test in both conditions.

The MT programs used in the 1950s and 1960s were restricted to word-for-word translations. In the 1980s there were great advances in discourse analyses but existing computer programs are still unable to analyze a text beyond the sentence level. The preliminary version of the MT program developed for this project was written for the purpose of producing comprehensible texts in Portuguese from original authentic texts in English. The translated passages were expected to contain significant numbers of errors at the morphological, semantic, and discourse level but, nevertheless, be capable of imparting meaning to the reader. The main

research questions were as follows. Would they be understood by Portuguese readers? How would reading comprehension scores based on these passages compare with scores based on the professional translations? The research model designed to answer the questions was based on a t-test comparison of the mean scores between the computer and the human translations. Difficulty, both in terms of the passages and the questions on them, was balanced by having half of the subjects read the Milky Way passage translated by the computer, while other half read the Iron passage translated by a human translator and the Milky Way passage translated by the computer. The questions for each of the two passages were exactly the same for both the computer and human translations. Subjects were 88 eleventh-grade students from two state schools in Southern Brazil. They belonged to typical lower middle-class families and were expected to have a functional reading knowledge of Portuguese. After reading two passages (one translated by a professional translator and the other by a computer), students answered the multiple-choice comprehension test.

On average, the subjects did rather poorly in the comprehension test. Out of a possible highest score of 10 for both the computer and the human translation, they obtained a mean of 5.6. Out of the five comprehension items for each passage, the subjects attained a mean of 2.84 for the human translation and 2.76 for the text translated by the computer. The difference (0.08) was small and, although it favored the human translation, it was not statistically significant ($p > 0.05$). The fact that the eleventh-grade students were able to read and understand authentic passages translated by a computer program with statistically the same level of comprehension as for passages translated by a professional translator, seems to have important implications in the area of computer translation and in the area of theory of reading comprehension. In the area of computer translation, the results show the potential of the lexical approach adopted for the writing of the MT program. It can be characterized not only by viewing the word as a treatment unit, but also by trying to describe how much the word interacts with the other units of the text. In the theory of reading comprehension, the results favor those theories of reading that emphasize the role of the reader in the comprehension process.

The results of the study, using a rudimentary version of an MT program and authentic texts taken from a weekly magazine, showed that readers can read and understand machine-translated passages with the same level of proficiency as they read passages translated by professionals.

The grammatical errors found in the machine translation did not significantly affect the subjects' comprehension scores. This suggests that MT, although unable to produce error-free translations, can be used for comprehension purposes. These results confirm the theory of reading comprehension in which readers contribute to the information provided by the text, making up for the blanks and deficiencies they find. The readers' previous knowledge of the world is a more important factor in comprehension than the language correctness of the text. Many subjects, reading the error-laden computer translation, obtained higher scores than other subjects reading the linguistically correct passage translated by a professional translator. The statistical analysis of the results indicated that the machine-translated passages, in spite of presenting some incorrect constructions, were understood by the subjects, both in terms of main ideas and details.

Farrington, B. (1994). BonAccord Revisited. System, 23(1/2), 21-26. (Article 17)

7-2 BonAccord: Semi-Intelligent Translation Machine

Farrington reports on features and innovations of "BonAccord" system for teaching L1 to L2 translation. It has been in existence for ten years, having started life under the name of "LITTRE." It was developed by the Scottish Education Department and the first version of the program, which ran on Apple II microcomputers, was distributed to a number of Scottish schools. The program was rewritten for BBC Micros and published in 1989 by WIDA Software. From the start BonAccord has differed from most CALL courseware by giving priority to language learning considerations rather than to developing technical aspects. It may still serve as a useful alternative approach to L2 teaching in a traditional method.

BonAccord runs on a PC with 640K of memory (MS-DOS 3.3 or later) and does not require color and graphics capabilities. The system is semi-intelligent that provides an automatic translation of short paragraphs. When the student types in a word, sentence or short paragraph, the system looks at individual words first, finds an equivalent number in the word list, and proceeds to search. If it finds the word number at the right place in the data tree, it moves to the translation of short paragraphs, prints the translation on the screen, and prompts for the next word. If it fails to find the word number at the expected place, it does one or two further checks before printing an appropriate error message. The system makes its way through the knowledge

base along a pathway decided by the learner's choices.

BonAccord presents the source text, which is a conventional translation passage of 100-200 words, in sections, five or six lines at a time. At the touch of a key the learner can at any time review and/or print both the full source text and the translation. In the conventional tutorial mode program, the system will ask the learner a question, and then proceed to process the response. In the case of BonAccord, however, the number of possible right answers is quite large and therefore the student is encouraged to consult the translations frequently while working through the passage. BonAccord is designed so it can be used either as a self-access tutorial system or as a classroom resource. It is well suited to what might be called a triangular mode working configuration (computer, teacher, and learner) that is not restricted to the use of the machine as a clever blackboard. Materials have been written for BonAccord at four different language interfaces: French to English, German to English, Hungarian to French, and Hungarian to English. Nothing has been produced for English to Spanish or English to Italian.

BonAccord is in use in numerous schools, and it works as follows: it presents a text in the source language and invites a learner to translate, checking the translation that the learner at a given knowledge level might be expected to know and also responding to all likely mistakes. The learner can move backward and forward through the text and can print out the translation. It can be used by students working on their own, or, perhaps more effectively, can be incorporated into the work of a class.

DISCUSSION AND INTEGRATION

Technology is evolving into an important interdisciplinary tool in L2 acquisition. Teachers are seeking to avail themselves of information with respect to instructional possibilities and resource materials in this realm (Forrest, 1993), and teachers have a more realistic appreciation for the complexity of L2 learning processes than ever before (Murphy, 1992). At the same time, non-traditional opportunities for L2 learning (CALL, and self-directed learning) appear more frequently in the literature. TESOL Journal provides evidence that educators have recognized the potential of CALL and are actively seeking effective technology-based materials and teaching strategies (Hunt, 1993). ESL students may have problems, particularly, in the areas of language, background knowledge, and advanced literacy skills (Kang, 1994). According to Goodfellow (1994), educated native speakers of English know around 17,000 base words. It takes at least a

4-year full-time job for non-native speakers just to be able to read a quality newspaper and another 13 years to become completely fluent in English. This estimate assumes that the non-native receives the same amount and quality of linguistic input that the native does, which is unlikely. The age of the non-natives is also a factor. Any methodologies or tools, which can facilitate and expedite the learning process, should be of interest to the educational profession. Educational technology has a potential to do just that, namely to accelerate the learning process. However, educational technology is a new discipline and there is no scientific basis for predicting its future direction (Sullivan, Igoe, Klein, Johes, & Savanye, 1993). Research on the potential of educational technology and its implementation in L2 acquisition is thus excessively important.

The 17 articles reviewed in the previous sections provide a cross section of technological tools as they are applied to L2 acquisition. This section integrates and analyzes the findings of the articles and provides conclusions, focusing on the current realities and future promises, through the following steps. First, a summary of the major contributions of each technology to L2 learning is provided. Second, major issues or concerns related to the implementation are presented. Third, a research method used in each study is given, following by a discussion of proposed future research. Finally, a brief discussion of Internet and another emerging technologies closes this selection.

Contributions of Educational Technology

Televisions, videotapes, and tape-recorders. These technologies have been used for several decades as a supplement to classrooms, or for self-directed learning in L2 acquisition. Applications of captioned video material, for example, have resulted in substantial improvements in English comprehension. Recent interest in these technologies centers on their integration with other educational systems in a computerized mode. These technologies are relatively inexpensive (require few technical skills) and are in extensive use. A related and older technology is the radio which has been successfully used in China, where its popularity is still growing (Yu, 1995). Feature films on video are easily available and are a contextually rich source of authentic material which can be exploited in the foreign language classroom (Voller & Widdows, 1993). In addition, excerpts from television programs and films serve as more reliable and stimulating materials for ESL learners than do commercially produced classroom series (Block, 1993). The introduction of satellite television enables different instructional activities to be broadcast

worldwide. Teachers in one country can be used to teach students in another country. This allows students to receive lessons from native English speaking faculty, no matter where the students are. Similar capabilities are starting to appear on Internet which will soon be able to provide many of the capabilities of TV.

Hand computers. Due to its lightweight and small size, the hand computer can be carried everywhere. Its major current L2 applications are to help in memorizing words, translation, and pronunciation. The hand computer can be combined with other technologies. For example, several computer-aided instruction packages, multimedia, and E-mail can be exercised on the hand computer. It may provide flexibility and motivation in memorizing words through repetition. The hand computer is also used to keep track of grades, attendance records, and other student information at Clay Spring Elementary School in Apopka, Florida (Information Week, October 3 1994, p. 57).

Computer conferencing (CC). CC can be viewed as a special case of E-mail in which the major objective in L2 is the creation of discussion opportunities between individuals or groups of students in different locations. Online education is a new domain of learning and overcomes many of the constraints of time and place that restrict access of instruction in traditional educational settings (Ahern & Repman, 1994). According to Waggoner (1992), the application of CC in instruction is growing rapidly. However, further research on the application of CC in various instructional contexts is necessary (Velayo, 1994). The newest technological innovation (desktop video teleconferencing) may provide outstanding opportunities to improve CC in L2 learning. However, no published material on this topic was found in this research.

E-Mail. E-mail can lead to extensive communication among the members of a group or a class, as well as between teacher and student and among teachers. It will be successfully integrated into existing curricula almost immediately since computer use has become widespread in most academic programs (D'Souza, 1992). Previous research has shown that E-mail is used by students of different countries to promote cultural awareness and by L1 and L2 students to improve writing skills. E-mail has innovative instructional possibilities, but it should be particularly suitable for instruction and practice in tasks where there is no pre-specified path to a solution and where problem solving and analytical strategies must be employed (Steinberg, 1992). As will be shown later, the use of the Internet (of which E-mail is a subset) is very new but most

promising.

Multimedia. The study by Brett (1955) proved that multimedia is beneficial for L2 learning. Sponder and Hilgenfeld (1994) presented various features of hypermedia (see Appendix B). The major multimedia tools are CD-ROM, hypertext, hypermedia, videodisc, animation, and virtual reality (VR). The major advantage of multimedia is its richness. Computerized multimedia are changing the role of multimedia from a passive presentation instrument to an active and interactive role where the learner can create, not just view information (Dwyer, 1994). This capability provides a major contribution to L2 learning by allowing students to determine the boundaries of what they learn, to select the most appropriate support media, and to learn at their own pace. Such capabilities help in stimulating interest, generating questions, and motivating investigation. Regardless of the instructional design underlying any specific application, the medium shapes the messages; however, the impact on learners of emerging media such as VR is still uncertain (Dede, 1992).

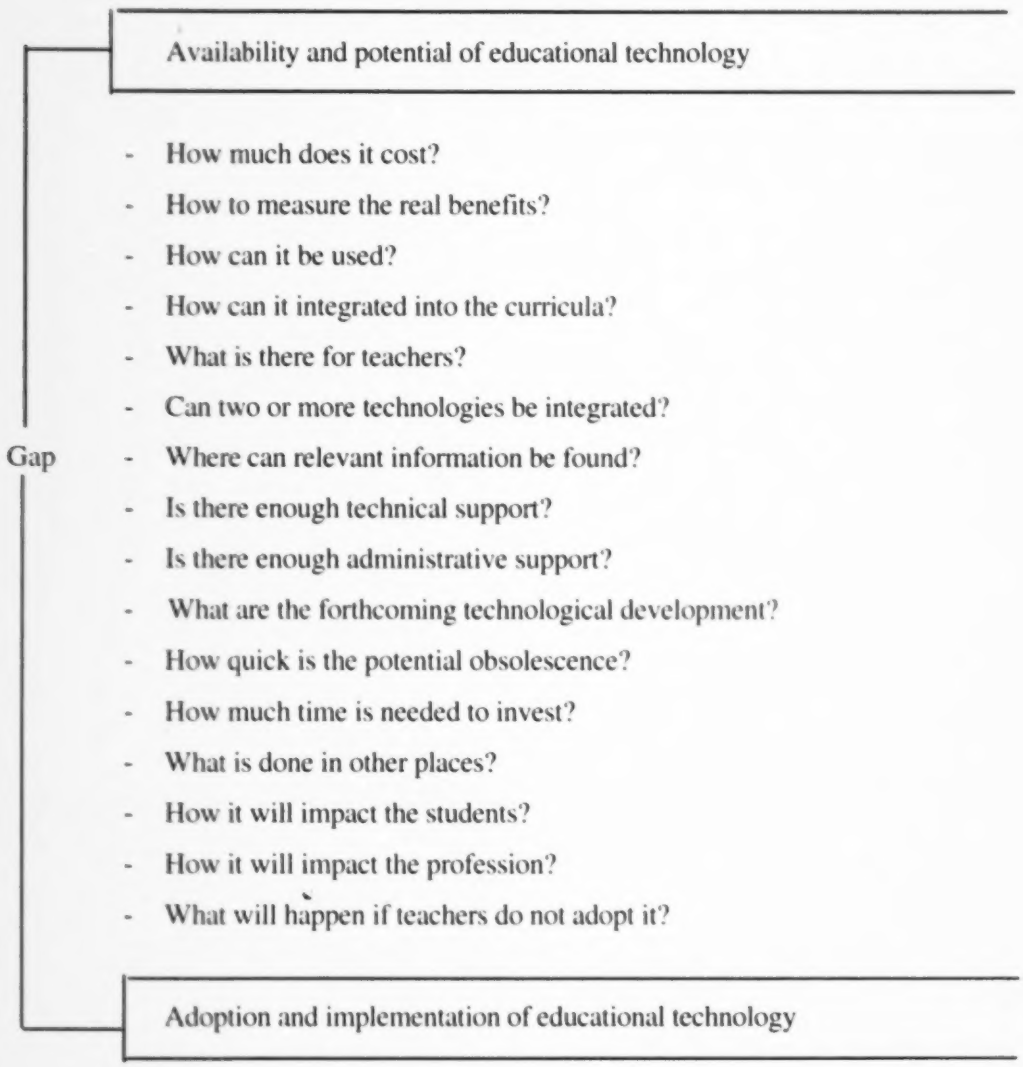
Computer-Assisted Language Learning (CALL). There is a considerable amount of research on the use of CALL for L1 learning while there is less evidence on the use of CALL for L2 learning. Enhancing a good command of English is a difficult and time-consuming task. The term "Language Acquisition Resource Center" may be a better way to characterize the possibilities of technological resources and related activities. Resources such as a "conversation room" or "reading room" provide opportunities for learning word-processing and other aspects of CALL. They are just as important as an innovative language laboratory itself (Murphy, 1992). Interestingly enough, CALL students do not appreciate games or pictures but do like the built-in interactive multimedia (Swann, 1992). CALL software aims at enhancing the study of grammar. Other ESL software focus on vocabulary or on grammar drill and practice, but CALL software can be a valuable resource for individual students since it has several other capabilities. Even the use of a standard word processor such as "Microsoft Word" or "WordPerfect" can be beneficial for enhancing grammar and composition. Latest versions of word processors have a grammar checker which enables an active response to grammatical problem solving and these will be improved in the near future. The state of the art in CALL programs is the addition of a knowledge-base component which could make it intelligent (for an overview, see Diessel, Lehmann & Vassileva, 1994).

Machine translation (MT). MT is one of the most promising computerized tools for L2 learning. Using MT, students can accelerate the learning process since they can check the accuracy of their translation. MT programs provide both on line dictionaries and automatic translation of individual words and short sentences. To translate from one language to another, it is necessary to combine two technologies. First, it is necessary to use artificial intelligence so that the computer can understand the meaning of individual words entered by typing, voice, or handwriting. Second, a technology called Natural Language Processing (NLP) enables the computer to understand the meaning of sentences and small paragraphs. Advanced systems can understand voice while ordinary systems understand only typed text. With improved machine storage and processing time, MT can be enhanced. Therefore, the speed and quality of translation are continuously improving with the improvement in computers.

Concerns in Applying Educational Technology

Many of the articles reviewed either ignore or at best minimize the various issues and concerns relating to the real world implementation of educational technologies. The purpose of most articles is to show the potential of the technologies and the authors are clearly biased in favor of their use. The articles do not involve rigorous evaluations. Success is expressed in loose terms, costs are ignored and issues related to a wide acceptance of the technologies are not discussed. Furthermore, as was shown in the case of E-mail and multimedia, new technologies could be used in several different configurations. However, most researchers were interested only in one type or aspect of one application, completely ignoring the others and the possible interaction among them. What we learned from this set of articles is basically that (1) there are exciting potential applications and that (2) there is a gap between potential applications and availability of technologies and the widespread adoption of technologies in educational institutions. This gap should be of major concern to educators and administrators. The dimensions of the gap are illustrated in Figure 1. The diagram lists some of the major issues and concerns which may be raised by educators who want to adopt one or more of the technologies.

Figure 1. The Gap Between Availability and Use


Availability and potential of educational technology
- How much does it cost?
- How to measure the real benefits?
- How can it be used?
- How can it integrated into the curricula?
- What is there for teachers?
- Can two or more technologies be integrated?
Gap
- Where can relevant information be found?
- Is there enough technical support?
- Is there enough administrative support?
- What are the forthcoming technological development?
- How quick is the potential obsolescence?
- How much time is needed to invest?
- What is done in other places?
- How it will impact the students?
- How it will impact the profession?
- What will happen if teachers do not adopt it?
Adoption and implementation of educational technology

It is obvious that extensive research is required in order to reduce the gap. Such research could range from the development of implementation methodologies (e.g., how to compute the cost-benefit ratio of a technology, or how to evaluate its success) to guidelines on how to answer concerns, for example, finding information or integrating the technology into the curriculum.

Research Methods used in the Articles

The research methods used in the 17 articles are in general neither too rigorous nor too sophisticated. They are summarized in Table 2:

Table 2. Summary of Methods Used in the Articles

Article Number		Research Method
1.	1-1	Simple Experiment (loosely controlled)
2.	1-2	Case Study
3.	1-3	Case Study
4.	2-1	Case Study
5.	3-1	Case Study
6.	3-2	Case Study
7.	4-1	Case Study
8.	4-2	Controlled Experiment
9.	4-3	Simple Experiment (survey of opinions)
10.	4-4	Case Study
11.	5-1	Theoretical/Descriptive
12.	5-2	Theoretical/Descriptive
13.	5-3	Simple Experiment
14.	6-1	Simple Experiment
15.	6-2	Theoretical/Experiment
16.	7-1	Theoretical/Experiment
17.	7-2	Theoretical/Descriptive

In order to assess the benefits of these technologies better, more rigorous research is needed. The use of experimental research, for example, should include control groups. Case studies should be replicated in several locations and be conducted under several configurations of independent variables. As an example, the evaluation of intelligent CALL can be very complex because of the large number of variables. Sophisticated methodologies proposed by Mark and Greer (1993) could be added. Most of the success stories reported in this literature review are qualitative in nature. It is essential to devise measurement scales and use a quantitative approach to measure the success of the technologies.

Internet and Emerging Technology

Recent developments in computer technologies could be used to enhance L2 acquisition. As an example, there are over 500 listings in ERIC but none of them are ESL applications. Two of these technologies are of a special interest, Internet and VR. Due to the newness of the emerging technologies, however, there are no publications regarding their application to ESL. The Internet is the most publicized computerized tool of 1994 to 1995 [e.g., see special issue of Educational Review, 29(6), 1994]. For an example of foreign language tutors available on Internet (most of them are free). The potential of Internet for ESL can be summarized as follows:

1 Teachers can find details about the most advanced research as well as the most advanced methodologies used in many universities in the world.

2 Teachers can create special bulletin boards dedicated to the ESL field.

3 Researchers, who deal with a certain technology or application in education, can exchange information and conduct discussions via the internet.

4 Teachers can design assignments in which students will be requested to conduct linguistic-based searches of information.

5 Special lessons and exercises, designed by experts, can be made available at little cost to teachers and schools, world wide.

6 Public domain software can be made available, free of charge, to faculty worldwide for experimentations.

7 Information regarding availability of ESL software and its quality and suitability can be disseminated to many schools and teachers.

8 Research projects can be enhanced with Internet. For example, questionnaires can be disseminated over the Internet to gather information.

9 Several of the E-mail projects described in this paper can be executed on Internet at little cost, even though they involve large numbers of participants in different cities.

10 Research on how students can browse the Internet is being conducted in Singapore.

Virtual Reality (VR). VR is a new technology whose use in education is currently experimental (e.g., see special issue of Educational Media International, December 1994). One of the major sub-fields of CALL is simulation, which can be made interactive using 3-D and sensors as it is done in VR. Learners can be "placed" in foreign countries and forced to converse in a

foreign language. Immediate feedback can be provided (Thorman & Maton, 1994). Current experimentation with VR is in such areas as geometry and geography where visualization is important. Since the cost of VR is very high at the moment, experimentation is limited. However, since the cost of the technology is expected to decrease while its capabilities increase, it could have potential for L2 in areas such as memorization of words, illustration of idioms and encouraging people to converse in English while being "placed" in English speaking scenarios. VR materials for ESL is now available on Internet.

CONCLUSION

This paper reviewed the current applications of various technologies which can be used to support L2 learners. It did not cover obvious applications such as word processing and using computers to execute calculations. Rather, it dealt with those applications which are either the subject of experiment or with those which are being used by only few educational institutions. This review of the literature can be concluded as follows: (1) there is an increasing interest in many countries in applying the educational technologies; (2) there are several new technologies which could be used in supporting ESL education and learning; (3) with the exception of technologies that are inexpensive and been around for a long time (e.g., television, tape-recorder), technologies such as Internet (which is currently not so inexpensive) need to be justified; (4) in general, current experiments in educational technologies ignore practical the issues of implementation, including cost-benefit justification; (5) most reported activities in the field do not employ any rigorous evaluation methodologies; and (6) more research is needed concerning issues of design, evaluation, integration into the curriculum, as well as the impact on education. Despite the outstanding issues, the future seems very promising. Several authors (e.g., Murphy, 1992; Hunt, 1993; Forrest, 1993; Wiburg, 1993; Giosso, 1993; Sullivan et al., 1993; Eckel, 1994), who are providing a general overview and assessing the use of educational technologies in L2 (and L1), conclude with the above sentiments regarding the future of second language acquisition.

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